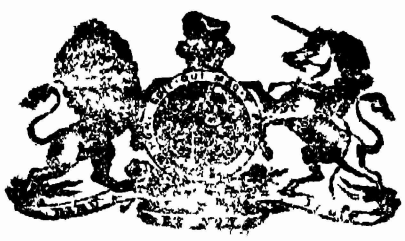
REPORT

ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE

KHARIF AND RABI SEASONS, 1890-91.



ALLAHABAD:

NORTH-WESTERN PROVINCES AND OUDH GOVERNMENT PRESS.

1891.

Price Re. 1-0-0.

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No. 981A. of 1891.

DEPT. OF LAND RECORDS AND AGRICULTURE, N.-W. P. AND OUDH.

Dated Cawnpore, the 12th August 1891.

From

T. W. HOLDERNESS, Esq.,
Director of Land Records and Agriculture,
North-Western Provinces and Oudh,

To

The CHIEF SECRETARY to GOVERNMENT,
North-Western Provinces and Oudh.

Sir,

I have the honour to submit the report on the Government Experimental Farm at Cawnpore for the year ending the 30th June last. The report has been drawn up under my supervision by the Assistant Director, who has been in charge of the farm throughout the year.

2. Two appendices have been added to the report this year. Appendix A is a report by Babu Lachhman Parshad Barmah, my Personal Assistant, on a small experimental farm which he conducts at Cawnpore at his own expense. His experiments are very carefully conducted, and the returns of outturn and cost of cultivation which he gives are undoubtedly reliable. Appendix B is a short account of some experiments which I started this year with the object of ascertaining the actual outturn of crops grown in the neighbourhood of the farm by ordinary cultivators.

3. The experiments on the farm varied little from those described in former years, but the interesting feature in the year is the effect which the very peculiar season of 1891 had on the different fields under wheat. The report shows that the crops on unmanured or lightly manured lands were considerably above the average, while those on the best fields yielded less than usual. The abnormal rainfall and high winds of February and March were destructive to high standing and heavy crops, while the lighter and less advanced crops were benefited by the rain and were able to recover from the wind. Judging from the outturn of the farm crops, it seems clear that the rabi of 1891 was inferior to that of 1890 in the Cawnpore district. The grain was poorer in quality and the produce was less. The average yield of wheat this year on the farm was 16 maunds or 21 bushels against 23 bushels in 1890.

4. Canadian and English wheats have been tested this year as in former years, with the indigenous varieties, and again the superiority of selected Muzaffarnagar seed has asserted itself. The Canadian oats and barleys were disappointing, as it was hoped that they would, as in Canada, quickly mature. But better results may be obtained next year from partially acclimatized seed. As a fodder crop the Canadian oats are likely to prove useful, as the straw is very long and rich.

5. The results obtained in some of the green soiled and indigo refuse plots (rabi statements Nos. III and IV) were remarkably good. With wheat at 16 seers the rupee four of the plots in statement No. IV, which were treated with indigo refuse, each gave a net profit of over Rs. 60 the acre, rising in one case to Rs. 87 the acre. This shows the value of a good wheat crop at present prices. In statement No. III green indigo ploughed in gave a net profit in wheat and straw of Rs. 38 an acre. The results obtained by

means of the more expensive kinds of manure, such as saltpetre, bone dust, and bone superphosphate, were less striking. The first two cannot be applied at a less cost than Rs. 10 the acre, and the third costs Rs. 20 the acre. To cover an outlay of Rs. 10 an increase of 4 maunds of wheat per acre over the produce of unmanured land is required. In some few of our plots we can show this or a larger increase over a series of years; but this is the exception.

6. The farm is in good order, and has been carefully managed during the year by the Assistant Director and the Farm Overseer, Ali Husain. It is frequently visited by zamíndárs and others, and the ploughs, pumps, sugar mills, and sugar making machines used on it are not unfrequently borrowed by the neighbouring cultivators.

I have the honour to be,

SIR,

Your most obedient servant,

T. W. HOLDERNESS,

Director.

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REPORT

ON THE

CAWNPORE EXPERIMENTAL STATION

FOR THE KHARIF AND RABI SEASONS OF 1890-91.

THE KHARÍF SEASON. *Character of the season.*—The rains during the kharíf season under report were quite abnormal, yet on the whole did not do any noticeable damage to any of the crops. At the beginning of the season the fall was unusually heavy and continuous, followed by a protracted break in August and September.

With one exception the kharíf experiments during the season were the same as noted in the last report. The term (five years) fixed for the experiment of sowing maize after American fashion having expired, the experiment of sowing a mixed crop of maize and indigo was substituted for it, the object being to determine the economy of mixed cropping as compared with the result of sowing the same crops separately.

The important experiments of the kharíf season are (1) with maize, (2) with cotton, (3) with sugarcane, and (4) with indigo.

The above may be thus classed—

(*a*) "Permanent" (*i.e.*, carried on year after year on the same plot of land and with the same kind of treatment).

(*b*) "Temporary" in respect of duration and of land used.

In the following paragraphs a detailed account of the above experiments is given. In accordance with the wish expressed in the orders of Government on the report of 1890 that the financial result of each experiment should be shown, a note has been added to such statement which will enable the net return of each plot to be easily calculated. It is, however, necessary to remark that the outturn of all kharíf crops varies largely with the accidents of the season, and that this detracts largely from the scientific value of kharíf experiments. The cultivator is able to replace a damaged kharíf crop by late sowing or by substituting another crop; but on an experimental farm this is impossible.

KHARÍF STATEMENTS NOS. I AND II.—*Experiment with maize.*—This experiment is carried on in 2 series each of 13 plots. In the first (or standard series) maize is sown year after year. In the duplicate series there is a rotation of maize and wheat. The experiment in the standard series is to ascertain the result of growing the same crop year after year on the same land with the same kind of manure or, as in one instance, with no manure at all. In the duplicate series the object of the experiment is partly to verify the result of the standard series and partly to see if rotation of maize with a wheat crop improves the yield, the manures being the same in kind and quantity.

Each of the 13 plots (in both series) save the unmanured ones receives a special kind of manure year after year.

KHARÍF STATEMENT No. I.—*Standard Series.—Manure experiment with maize.*

Number of plot per farm map.	Manure applied per acre.	Value of manure.	Produce per acre in pounds.				Increase or decrease per acre over unmanured plot.			
			Grain.		Stalks.		In grain.		In stalks.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
K. 10	Sheep dung, 180 maunds ...	5 6 0	729	980	5,735	8,131	+378	+109	+1,357	+2,807
K. 9	Poudrette, 180 maunds ...	7 3 0	1,030	1,549	6,232	7,986	+679	+678	+1,854	+2,662
K. 8	Ashes of 180 maunds of cow dung and saltpetre, 3 maunds ...	14 6 0	1,105	1,295	7,752	8,240	+754	+424	+3,374	+2,916
K. 5	Saltpetre, 3 maunds	9 0 0	711	1,186	4,647	7,704	+360	+315	+269	+2,380
K. 11	Ditto, ditto, and bone dust, 4½ maunds	19 11 0	811	1,065	7,210	7,502	+460	+194	+2,832	+2,178
K. 3	Cow dung, 180 maunds ...	5 6 0	911	1,053	3,680	8,518	+560	+182	−698	+3,194
K. 1	Ditto, ditto, and bone dust, 4½ maunds	16 1 0	977	1,488	4,990	9,027	+626	+617	+612	+3,703
K. 2	Ditto, ditto, and gypsum, 3 maunds	10 10 0	916	1,246	425	7,671	+565	+375	−3,953	+2,347
K. 4	Ashes of 180 maunds of cow dung .	5 6 0	457	1,016	4,886	8,204	+106	+145	+8	+2,880
K. 7	Sheep dung, 180 maunds, and bone dust, 4½ maunds	16 1 0	1,036	1,670	6,088	8,482	+685	+799	+1,710	+3,158
K. 6	Saltpetre, 3 maunds, and bone superphosphate, 3 maunds ...	30 0 0	871	1,367	2,460	8,688	+520	+496	−1,918	+3,364
K. 12	Sheep dung, 180 maunds, and gypsum, 3 maunds	10 10 0	961	1,113	4,880	7,817	+610	+242	+502	+2,493
K. 13	No manure	...	351	871	4,378	5,324	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs 16-8-0 per acre, including rent, seed, labour, &c, but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 41lbs of grain and Re. 1 per 410lbs. of stalks for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs 34 an acre, giving a net profit of Rs 17-8-0. The average net profit, however, on this plot for the previous five years was only Rs. 2-8-0. Nos. 7, 9, and 6 have given a net profit this year of Rs. 28-12-0, Rs. 33-5-0, and Rs 8-0-0, and for the previous five years Rs. 7-8-0, Rs. 16, and a loss of Rs. 19-4-0 respectively.

Area of each plot, 400 square yards.

KHARÍF STATEMENT No. II.—*Kharíf duplicate series.—Manure experiment with maize.*

Number of plot per farm map.	Manure applied per acre.	Value of manure.	Produce per acre.				Increase or decrease per acre over unmanured plot.			
			Grain.		Stalks.		In grain.		In stalks.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Alb. 1	Sheep dung, 180 maunds ...	5 6 0	741	1,561	4,703	8,373	+475	+750	+1,417	+3,109
Alb 2	Poudrette, 180 maunds ...	7 3 0	910	1,936	3,597	9,244	+644	+1,125	+711	+3,980
Alb. 3	Ashes of 180 maunds, saltpetre, 3 maunds	14 6 0	913	938	4,218	7,272	+617	+127	+1,332	+2,008
Alb 4	Saltpetre, 3 maunds	9 0 0	520	629	3,839	5,566	+254	−182	+953	+302
Alb. 5	Saltpetre, 3 maunds, and bone dust, 4½ maunds	19 11 0	553	774	3,992	9,466	+287	−37	+1,106	+4,202
Alb. 6	Cow dung, 180 maunds ...	5 6 0	741	653	4,189	6,340	+475	−158	+1,303	+1,076
Alb. 7	Cow dung, 180 maunds, and bone dust, 4½ maunds	16 1 0	747	1,113	4,383	7,998	+481	+302	+1,497	+2,734
Alb. 8	Cow dung, 180 maunds, and gypsum, 3 maunds	10 10 0	738	1,053	4,303	8,155	+472	+242	+1,417	+2,891
Alb. 9	Ashes of 180 maunds of cow dung ..	5 6 0	406	303	4,155	5,143	+140	−508	+1,269	−121
Alb. 10	Sheep dung, 180 maunds, and bone dust, 4½ maunds	16 1 0	608	1,234	4,813	8,579	+342	+423	+1,927	+3,315
Alb 11	Saltpetre, 30 maunds, bone superphosphate, 3 maunds... . .	30 0 0	626	1,367	2,616	8,143	+360	+556	−279	+2,879
Alb. 12	Sheep dung, 180 maunds, and gypsum, 3 maunds	10 10 0	659	1,488	5,140	8,736	+393	+677	+2,254	+3,472
Alb. 13	No manure	...	266	811	2,886	5,264	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 16-8-0 per acre, including rent, seed, labour, &c, but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re 1 per 41lbs of grain and Re. 1 per 410lbs of stalks for fodder. According to this estimate, the outturn of the unmanured plot this year was worth Rs. 32-12-0 an acre, giving a net profit of Rs. 16-4-0. The average net profit, however, on this plot for the previous five years was nothing, rather a loss of Rs. 3. The net profit this year of Nos. 2 and 1 was Rs. 53 and Rs. 36-4-0, and for the previous 5 years Rs. 7-6-0 and Rs. 6-10-0 respectively.

Area of each plot, 400 square yards.

In the standard series seed at the rate of six seers per acre was sown on the 15th of June and in the duplicate series on the 12th of the same month. In both cases it was sown behind the country plough, the plots being ploughed twice with the improved plough 5 inches deep and twice with the country plough. The plots were weeded once and the plants earthened up once. The seed in the plots of the duplicate series did not germinate well and evenly, as heavy rain came on in the course of sowing. This caused the plots to remain under water for several days and prevented the sowing of the entire standard series on one day. In the badly germinated plots of the duplicate series the seed was again dibbled. Thus the growth of the plants and therefore their yield was unequal.

In the season under report sheep dung and bone dust, poudrette, saltpetre, and bone superphosphate, cow dung and gypsum, ashes of cow dung and saltpetre have given the best yield. This result is, on the whole, confirmed by the duplicate series and is also in accord with the results of past years.

KHARÍF STATEMENT No. III.—This experiment is named "miscellaneous" and dates back from 1884. The series consists of 8 plots each of the size of 400 square yards.

These plots were sown on the 12th June with six seers of maize seed per acre. The number of ploughings and weedings was the same as in the foregoing instance. The seed in plot No. 3 did not germinate evenly, and unfortunately the same plot was injured to a certain extent by wild pigs. The woollen refuse has again proved true to its former results as it has given the largest yield. In every year and in all kinds of season too wet or too dry it, up to this time, has proved to be good for the crop to which it has been applied. On maize especially it has a wonderful effect. Next to this come poudrette and sheep dung.

KHARÍF STATEMENT No. III.—*Miscellaneous manure experiment with maize.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease per acre over unmanured plot.			
			Grain.		Stalks.		In grain.		In stalks.	
			Average for previous five years	This year.	Average for previous five years	This year.	Average for previous five years	This year.	Average for previous five years.	This year.
		Rs. a. p	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
N. 1	Woollen refuse, 120 maunds, and lime, 12, maunds.	3 9 0	1,718	2,505	6,427	11,664	+ 989	+ 2,396	+ 2,887	+ 9,075
N. 2	Sheep dung, 120 mds.	3 10 0	1,113	1,609	4,875	8,857	+ 384	+ 1,500	+ 1,335	+ 6,268
N. 3	Cow dung, 120 „	3 10 0	769	1,174	3,970	7,768	+ 40	+ 1,065	+ 430	+ 5,179
N. 4	Poudrette, 120 „	4 13 0	1,094	1,742	3,982	8,107	+ 365	+ 1,633	+ 442	+ 5,518
N. 5	Horse dung, 120 „	3 10 0	1,059	1,367	5,720	8,022	+ 330	+ 1,258	+ 2,180	+ 5,433
N. 6	Pig dung, 120 „	3 10 0	1,162	992	6,202	7,599	+ 433	+ 883	+ 2,662	+ 5,010
N. 7	Saltpetre, 120 „	9 0 0	1,098	605	5,420	6,377	+ 369	+ 496	+ 1,880	+ 3,788
N. 8	No manure ...	...	729	109	3,540	2,589	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 16-8-0 per acre, including rent, seed, labour, &c., but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re 1 per 41lbs. of grain and Re. 1 per 410lbs. of stalk for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs 9 an acre, giving a net loss of Rs. 7-8-0 The average net profit, however, on this plot for the previous five years was Rs 9-12-0 The net profit this year of Nos. 1 and 4 was Rs. 69-4-0 and Rs. 41 and for the previous five years Rs. 36-9-0 and Rs. 15-0-0 respectively.

Area of each plot, 400 square yards.

KHARÍF STATEMENT No. IV.—This experiment was for five years, which term has expired this year. It is to determine the effect of early and late sowing of a maize crop. One plot of 1,715 square yards was sown on the 22nd of May and was maintained by means of four waterings, and the other plot of the same capacity was sown after the first shower on the 3rd of July. The seed and all other treatments, ploughing, weeding, &c., were in both cases the same as noted in the foregoing paragraphs.

Both plots suffered from flooding, and owing to short supply of canal water the irrigated plot received insufficient watering. The yield on both plots was very poor and the experiment for the year was a failure. This experiment is an important one. It is therefore intended to keep it for five years more.

KHARÍF STATEMENT No. IV.—*Experiment in early and late sowing of maize.*

Number of plot per farm map.	Mode of sowing.	Produce per acre in pounds.				Increase or decrease.			
		Grain.		Stalks.		In grain.		In stalks.	
		Average for previous three years.	This year.	Average for previous three years.	This year.	Average for previous three years.	This year.	Average for previous three years.	This year.
35 B.	Sown early ...	1,600	579	9,101	7,000	+335	+121	+2,438	+1,876
35 A. C.	Sown late ...	1,265	458	6,663	5,124	...	...	...	...

NOTE.—The cost of cultivation in the second plot may be taken at Rs. 16-8-0 per acre, including rent, seed, labour, &c., in the first plot the irrigating charges add Rs. 6 the acre. The value of the produce at a reasonable estimate may be put at Re. 1 per 41lbs. of grain and Re. 1 per 410lbs. of stalk for fodder According to this estimate the outturn of the late sown plot this year was worth Rs. 23-8-0 an acre, giving a net profit of Rs 7. The average net profit, however, on this plot for the previous three years was Rs. 30-8-0. The net profit this year of the early sown crop was Rs. 8-8-0 and for the previous three years Rs. 38-12-0.

KHARÍF STATEMENT No. V.—*Experiment with cotton.*—This experiment is to be conducted for five years, three of which have elapsed, including the season under review, and it is to determine the effect of certain manures on cotton. This series consists of 6 plots, each of 400 square yards. The plots were sown with six seers of seed per acre on the 12th of June, being ploughed twice with the improved plough and weeded three times. The cotton picking began from the 21st of September and ended on the 15th of March.

In 1889, though the plants grew very luxuriantly, the yield was not good, as the crop was attacked by grubs. This season yield was better.

Woollen refuse in this case too, has given good results. The mixture of kainit and gypsum has come out next.

KHARÍF STATEMENT No. V.—*Experiment as to the effect of certain manures on cotton.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.			
			Cleaned cotton.		Seed.	
			Average for previous two years.	This year.	Average for previous two years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.
Ab. 1	Fresh silt from canal, 500 maunds	1 4 0	145	150	236	297
Ab 2	Kainit, 4 maunds, and gypsum, 4 maunds ...	12 8 0	139	203	242	402
Ab. 3	Farmyard manure, 180 maunds, and gypsum, 1 maund 14½ seers	7 12 0	146	218	248	436
Ab 4	Farmyard kainit, 1 maund 14½ seers ...	8 3 0	164	230	266	460
Ab. 5	Woollen refuse, 120 maunds	3 9 0	212	263	356	523
Ab. 6	No manure	...	103	94	182	185

NOTE.—The cost of cultivation may be taken at Rs. 26-12-0 per acre, including rent, seed, labour, &c., but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 6lbs. of clean cotton and Re 1 per 61lbs. of seed. According to this estimate the outturn of the unmanured plot this year was worth Rs. 18-8-0 an acre, giving a net loss of Rs. 8-4. The average net loss, however, on this plot for the previous two years was Rs. 6-12-0. The net profit this year of Nos. 5 and 4 was Rs. 22-3-0 and Rs. 10-13 and for the previous two years Rs. 10-11-0 and a loss of Rs. 3-7-0 respectively.

Area of each plot, 400 square yards.

KHARÍF STATEMENT No. VI.—*Experiments with cotton.*—This is an experiment with different varieties of imported cotton seed. This is the third year out of the

five for which this experiment is to continue. The seed of varieties Nos. 9 to 11 have been recently obtained direct from America. Seed was sown on the 18th of June at the rate of six seers per acre. Picking began from the 19th of October and ended on the 15th of March. The freshly imported varieties flowered a few days later than those which had been acclimatized in this province some years ago.

Cotton throughout the district suffered greatly this year from untimely and heavy rainfall and the attacks of grubs. The farm crop similarly suffered. The yield from acclimatized varieties (Nos. 1 to 8) has been better than the yield of the newly imported varieties.

KHARÍF STATEMENT No. VI.—*Experiment with different varieties of imported cotton seed.*

Number of plot per farm map.	Varieties of cotton seed.	Produce per acre.			
		Cleaned cotton.		Seed.	
		Average for previous two years.	This year.	Average for previous two years.	This year.
		lbs.	lbs.	lbs.	lbs.
41A*a*(1)	Upland Georgian	136	103	300	228
41A*b*(2)	Tree cotton	143	115	343	251
41A*c*(3)	Louisiana	153	126	360	319
41A*d*(4)	Garo Hills	146	91	286	137
41A*e*(5)	Hybrid	175	103	347	263
41A*f*(6)	Sea Island	134	91	360	251
41A*g*(7)	Egyptian	146	80	335	194
41A*h*(8)	Hinganghát	140	103	339	251
19*e*(9)	S. B., Mexcy (Texas)	102	60	184	100
19*f*(10)	Shines' Early Prolific	82	40	164	100
19*g*(11)	Jones, Improved	102	60	204	120
19*h*(12)	Country	180	60	320	80

NOTE.—The cost of cultivation may be taken at Rs. 31-4-0 per acre, including rent, seed, labour, &c., and manure (value Rs 4-8-0). The value of the produce at a reasonable estimate may be put at Re. 1 per 6lbs. of clean cotton and Re. 1 per 61lbs. of seed. According to this estimate the outturn of the country seed plot this year was worth Rs. 11-4-0 an acre, giving a net loss of Rs. 20. The average net profit, however, on this plot for the previous two years was Rs. 4. The loss this year of the Nos 3 and 2 was Rs. 5 and Rs. 8-0-0, and for the previous two years a net profit of Re. 0-2-0 and a loss of Re. 1-10-0 respectively.

Area of each plot, 242 square yards.

KHARÍF STATEMENT No. VII.—The results of the early and late sowing of cotton are shown in this statement.

The experiment was tried with American seed obtained four years ago. In 4 plots seed of 4 varieties of cotton was sown on the 12th of May, and in other 4 plots seed of the same varieties was sown on the 13th of June when the rain had set in. Picking of all these plots began from the 28th December and continued till the 15th March. The late sown plots suffered greatly from heavy rain and from the attacks of an insect.

The experiment clearly establishes that if irrigation is possible, cotton should be sown before the commencement of the rains. The plants are vigorous. They do not suffer from the excess of rains and generally escape the attacks of insects.

KHARÍF STATEMENT No. VII.—*Experiment with early and late sowing.*

Number of plot per farm map.	Variety of cotton sown.		Produce per acre.			
			Cleaned cotton.		Seed.	
			Average of previous two years.	This year.	Average of previous two years.	This year.
			lbs.	lbs.	lbs.	lbs.
19*a*.	Sown before rain.	S. B. Mexcy (Texas) ...	170	200	310	360
19*b*.		Shines' Early Prolific ...	140	140	285	300
19*c*.		Jones Improved ...	105	100	245	220
19*d*.		Country	180	260	300	440
19*e*.	Sown after rain.	S. B. Mexcy (Texas) ...	180	60	320	100
19*f*.		Shines' Early Prolific ...	140	40	280	100
19*g*.		Jones, Improved ...	180	60	360	120
19*h*.		Country	180	60	320	80

KHARÍF STATEMENT No. VIIIA.—*Experiments with sugarcane.*—This statement shows the produce of certain varieties of sugarcane.

The object of the experiment is (1) to determine the productive capacity of 4 varieties of cane, seed of which was obtained three years ago from Behea, Sháhjahánpur, and Moradabad; (2) to ascertain whether sowing in line as done in the West Indies has any advantage over the indigenous way of sowing.

The seed was planted on the 20th March. The top pieces of cane which, as a rule, are thrown away by cultivators in these parts are utilized for seed. The field was ploughed four times with the improved plough, weeded and hand-hoed four times, watered five times. The Sháhjahánpur variety gave the largest produce per acre, while the method of planting cane as done in these provinces yields a far larger produce than the method practised in the West Indies.

KHARÍF STATEMENT No. VIIIA.—*Experiment* (1) *in the yield of different varieties of sugarcane*; (2) *in the Native and Indian method of sowing.*

Number of plot per farm map.	Detail of experiment.	Produce per acre.				Percentage of juice on cane.
		Weight of cane per acre.		Weight of juice per acre.		
		Average for previous three years.	This year.	Average for previous three years.	This year.	
	Behea seed (Mango or Dhaul).	lbs.	lbs.	lbs.	lbs.	
26B1*a*	Sown in line	13,832	16,262	7,052	9,131	56
26B1*b*	Sown in the indigenous way	20,144	20,489	10,404	11,229	55
	Sháhjahánpur seed (Dekchan).					
26B1*c*	Sown in line	7,092	17,263	6,123	10,148	59
26B1*d*	Sown in the indigenous way	16,013	20,376	9,137	12,116	51
	Moradabad seed (Baraukha).					
26B2*a*	Sown in line	14,896	5,566	7,317	2,323	42
26B2*b*	Sown in the indigenous way	20,743	9,227	10,376	4,291	46
	Country seed (Matna).					
26B2*c*	Sown in line	20,010	4,888	10,999	2,065	42
26B2*d*	Sown in the indigenous way	25,287	3,388	12,051	2,178	64

KHARÍF STATEMENT No. VIIIB.—This statement shows the result of a peri crop (ratooned cane stock kept a second year after the first year's crop was taken).

This experiment is to be conducted for a period of five years, 3 of which have now elapsed. Its object is to determine the economic value of keeping the ratooned stocks of sugarcane a second year. When the last year's crop was off, the field was watered and ploughed once and then the stumps set on fire. On the 10th April it was topdressed with 200 maunds of farmyard manure and hand-hoed. It was watered five times in the hot weather.

A comparison of the yield with those given in the preceding statement shows that this year the peri crop in many respects has given better results than the first year's crop.

KHARÍF STATEMENT No. VIIIB.—*Experiment to determine the economic value of peri (second year cane stock).*

Number of plot per farm map.	Detail of experiment.	Weight of cane per acre.		Weight of juice per acre.	
		Average for last two years	This year.	Average for last two years.	This year.
	Peri of Behea seed (Mango or Dhaul).	lbs.	lbs.	lbs.	lbs.
24*a*	Sown in line	1,069	14,211	5,481	7,020
24*b*	Sown in the indigenous way... ...	10,116	20,837	5,949	11,432
	Sháhjahánpur seed (Dekchan).				
24*c*	Sown in line	14,160	20,757	7,200	11,752
24*d*	Sown in the indigenous way... ...	17,760	22,034	9,520	12,390
	Moradabad seed (Baraukha).				
24*e*	Sown in line	14,967	14,690	7,291	7,888
24*f*	Sown in the indigenous way... ...	1,657	17,212	8,013	8,117
	Country seed (Matna).				
24*g*	Sown in line	9,816	17,651	5,229	8,431
24*h*	Sown in the indigenous way... ...	13,908	27,208	7,188	12,869

KHARÍF STATEMENT No. IX.—*Experiments with indigo.*—This statement shows the results of applying gypsum to indigo. This experiment is to be carried on for five years : four years have already elapsed.

Three plots are kept under this experiment. To one of these plots no manure is applied. In the 2nd gypsum is ploughed in, while the third plot is topdressed with the same quantity of gypsum when the plants are four inches high. The seed was sownon the 21st of April, but owing to insufficiency of moisture in the soil it did not germinate evenly. The supply of canal water at this time proved very inadequate, and so the plants did not thrive so well as in previous years.

Gypsum has decidedly proved a good manure for indigo. This year again the plot in which it was ploughed in has given better results than the plot in which it was applied as a top-dresser.

KHARÍF STATEMENT No. IX.—*Determination of the effect of gypsum on indigo.*

Number of plot per farm map.		Treatment.	Average yield of green indigo per acre.		Increase or decrease over unmanured plot.	
			Average of last two years.	This year.	Average of last two years.	This year.
			lbs.	lbs.	lbs.	lbs.
P. 1	4	Gypsum applied 4 maunds per acre and ploughed in as manure, valued Rs. 3 ...	8,465	5953	+ 7,892	+ 1,682
P. 5	8	Topdressed with gypsum when plants were 6 inches high, valued Rs. 3 ...	7,060	5,457	+ 6,437	+ 1,186
P. 9	12	No manure	573	4,271	...	...

Note.—The cost of cultivation may be taken at Rs 19 per acre, including rent, seed, labour, &c , but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re 1 per 300lbs. of green crop. According to this estimate the outturn of the unmanured plot this year was worth Rs 14-4-0 an acre, giving a loss of Rs. 4-12-0. The average loss, however, on this plot for the previous two years was Rs 17. The loss this year of Nos. 4 and 8 was Rs. 2-4-0 and Rs. 3-13-0, and net profit for the previous two years Rs. 6 and Re. 1-8-0 respectively.

Area of each plot, 1,600 square yards.

KHARÍF STATEMENT No. X.—*Experiment with miscellaneous grain.*—This statement shows the yield of some kharíf food crops commonly grown. There are 18 plots in this series, each of which measures 400 square yards. This experiment is to continue for five years, three of which have expired. All these plots were ploughed and weeded twice. They were sown on the 3rd July. Owing to the heavy rains in July all the crops suffered much and the yield was poor.

KHARÍF STATEMENT No. X.—*Experiment in outturn of miscellaneous kharíf crops.*

Number of plot per farm map.	Crop.	Produce per acre.			
		Grain.		Stalks.	
		This year.	Average of last two years.	This year.	Average of last two years.
		lbs.	lbs.	lbs.	lbs.
Mt. 1	Cotton and arhar...	12	...	24	...
Mt. 2	Jowár for chari	...	...	10,709	3,770
Mt. 3	Urd	206	134	1,730	690
Mt. 4	Mung	133	139	093	696
Mt. 5	Moth	182	460	908	884
Mt. 6	Lobia	73	521	484	1,567
Mt. 7	Bajra and arhar	97	630	968	3,152
Mt. 8	Bájra	121	291	2,904	3,025
Mt. 9	Jowár	605	726	9,680	4,885
Mt. 10	Jowár and arhar	387	696	5,324	6,480
Mt. 11	Til	109	103	508	877
Mt. 12	Arhar	...	587	...	1,659
Mt. 13	Hemp	750	424	290	2,494
Mt. 14	Kodon	339	273	641	635
Mt. 15	Merwa	496	605	859	1,041
Mt. 16	Khurti	665	1,041	2,844	2,323
Mt. 17	Mustard	...	303	...	2,565
Mt. 18	Indigo	...	...	11,922	...

RABI SEASON EXPERIMENTS.

THE RABI SEASON.—*Character of the Season.*—At the beginning the season looked very promising. Ploughing and sowing on the whole farm were done in good and opportune time. The seed germinated well in nearly all the fields, and everything looked excellent till the ears formed; but on the 23rd of January heavy rain fell throughout the whole night, accompanied by high winds, which beat down the advanced plants. In February from 5th to 7th there was a severe frost, which also did great harm. It killed the late blossoms and dried the juice which was wanted to nourish and mature the grain, which thus remained shrivelled and ill formed. At this time a strong west wind kept on blowing for several days, which added to the effect of frost. The fields with high cultivation suffered more because their crop was beaten down. The unmanured plots this year did better than usual.

In the season under report in the farm proper the area under wheat was 34 bighas 2¾ biswas (about 17 acres) against 35 bighas 18 biswas (about 18 acres). The total produce this year was 273 maunds 4¼ seers, the average per acre being only about 16 maunds or 1300lbs., ranging from 430 to 2,904lbs. The average outturn per acre last year was 17⅛ maunds.

This year the largest yield was obtained from the green soiling series (*vide* Statement No. IV). One plot of this series, which is manured with old indigo refuse and lime, gave an outturn of 2,904lbs. or 35 maunds per acre. This is larger than the maximum yield obtained last year, which was 2,856lbs. per acre (Rabi Statement No. II, plot No. 3, for 1889-90). Two more plots in the same series this year yielded 2,613lbs. and 2,485lbs. per acre respectively. The poorest outturn was obtained from Red Ferm, a variety of Canadian wheat, received through the Government of India, being only 97lbs. per acre. The seed, not being acclimatized, was naturally more susceptible to injuries.

The rabi season experiments are chiefly confined to wheat: potato, barley, peas, and gram also occupy a limited, but a comparatively small, area. As stated in previous reports the experiments in this season are of two kinds, "permanent" and "temporary."

STATEMENTS NOS. I AND II MANURE.—*Experiments with wheat.* Of all the permanent experiments this stands first; it is conducted in two series called "standard" and "duplicate." Each of these series consists of 13 plots. In the "standard" series wheat is sown year after year without any rotation, while in the series called "duplicate" the plots are cropped one year with wheat and another year with maize. The corresponding plots in either series receive a special kind of manure year after year, and in every other respect all the plots receive the same treatment.

The object of this experiment is to observe (*a*) the effect of ordinary and artificial manures on wheat; (*b*) the utility of rotation; (*c*) how long wheat can be grown year after year on the same land without manure; and (*d*) which manure best returns to the soil what the plant consumes.

As usual, Muzaffarnagar wheat seed was sown in these plots, quantity being 120lbs. per acre. The standard series were sown on the 24th and the duplicate series on the 25th October. They were harvested on the 8th and 9th of April respectively. All the plots were ploughed twice with the improved plough and twice with the country plough. They were weeded once and watered thrice. Statements Nos. I and II show that the outturn of many of the plots in the standard series is, as usual, less than the outturn of corresponding plots in the duplicate series. This year plot No. 10 in the duplicate series has given the largest yield, and plots Nos. 8 and 9 rank next to it. Last year plot No. 3 had stood first. The advantage of rotation is obvious, and it is also clear that the ashes of cow dung compared with the unburnt dung are of very little value as a manure for wheat.

Rabi Statement No. I.—*Standard Series.—Manure experiment with wheat.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease over unmanured plot per acre.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years	This year.
		Rs. a. p	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
R. 1	Saltpetre, 3 maunds	9 0 0	1,378	1,440	2,928	2,456	+336	+218	+1,041	+230
R. 2	Saltpetre, 3 maunds, and bone dust, 4½ maunds	19 11 0	1,387	1,597	2,594	2,759	+345	+375	+707	+533
R. 3	Cow dung, 180 maunds ...	5 6 0	1,321	1,537	2,778	3,310	+279	+315	+891	+1,114
R. 4	Ditto and bone, dust, 4½ ds,	16 1 0	1,688	1,742	2,655	3,545	+646	+520	+768	+1,319
R. 5	Ditto and gypsum, 3 mds. ...	10 10 0	1,386	1,767	2,786	3,267	+344	+545	+899	+1,041
R. 6	Sheep dung, 180 maunds ...	5 6 0	1,388	968	2,367	4,247	+346	−254	+480	+2,021
R 7	Ashes of 180 maunds of cow dung .	5 6 0	972	1,367	2,043	2,321	−70	+145	+156	+95
R. 8	Sheep dung, 180 maunds, and bone dust, 4½ maunds ..	16 1 0	1,188	1,718	2 398	3,207	+146	+496	+511	+981
R. 9	Saltpetre, 3 maunds, and bone superphosphate, 3 maunds	30 0 0	1,146	1,648	2,298	3,194	+104	+426	+411	+968
R 10	Sheep dung, 180 maunds, and gypsum, 3 maunds	10 10 0	1,289	1,682	2,490	2,824	+247	+460	+603	+598
R. 11	No manure	...	1,042	1,222	1,887	2,226	...	...	...	...
R. 12	Poudrette, 180 maunds	7 3 0	1,379	1,500	2,461	4,259	+337	+278	+574	+2,033
R 13	Ashes of 180 maunds of cow dung and saltpetre, 3 maunds ...	14 6 0	1,246	1,404	2,330	2,989	+204	+182	+443	+763

Note.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c, but exclusive of manure. The value of the produce at a reasonable estimate may be put at Re 1 per 32lbs of grain and Re 1 per 246lbs. of straw for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs 47 an acre, giving a net profit of Rs 20. The average net profit, however, on this plot for the previous five years was only Rs 13 The net profit this year of Nos. 5 and 4 was Rs. 30-14 0 and Rs. 25-13-0, and for the previous five years Rs. 16-14-0 and Rs 20-2-0 respectively.

Area of each plot, 400 square yards.

Rabi Statement No. II.—*Duplicate Series.—Manure experiment with wheat.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease over unmanured plot per acre.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Alb. 1	Saltpetre, 3 maunds	9 0 0	1,401	1,319	2,848	2,239	+246	−278	+416	−556
Alb. 2	Saltpetre, 3 maunds, and bone dust, 4½ maunds	19 11 0	1,849	1,742	3,330	2,964	+694	+115	+898	+169
Alb. 3	Cow dung, 180 maunds... .	5 6 0	1,162	1,779	3,255	2,973	+ 7	+182	+823	+178
Alb. 4	Ditto, and bone dust, 4½ maunds	16 1 0	1,362	1,718	2,459	3,073	+207	+121	+ 27	+278
Alb. 5	Ditto, and gypsum, 3 maunds...	10 10 0	1,384	1,706	2,563	3,473	+229	+109	+131	+678
Alb. 6	Sheep dung, 180 maunds ...	5 6 0	1,515	1,791	2,480	2,529	+360	+194	+ 48	−266
Alb. 7	Ashes of 180 maunds of cow dung ...	5 6 0	1,285	1,755	2,650	2,505	+130	+158	+218	−290
Alb. 8	Sheep dung, 180 maunds, and bone dust, 4½ maunds	16 1 0	1,474	2,069	2,807	3,448	+319	+472	+375	+653
Alb. 9	Saltpetre, 3 maunds, and bone superphosphate, 3 maunds	30 0 0	1,412	2,009	2,468	3,884	+257	+412	+ 36	+1,089
Alb. 10	Sheep dung, 180 maunds, and gypsum, 3 maunds	10 10 0	1,438	2,130	2,834	4,646	+283	+533	+402	+1,851
Alb. 11	No manure	...	1,155	1,597	2,432	2,795	...	...	...	...
Alb. 12	Poudrette, 180 maunds	7 3 0	1,152	1,972	3,528	5,118	− 3	+375	+1,096	+2,323
Alb. 13	Ashes of 180 maunds of cow dung, and saltpetre, 3 maunds ...	14 6 0	1,313	1,670	2,773	3,376	+158	+ 73	+341	+581

Note.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c., but without manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 32lbs of grain and Re 1 per 246lbs. of straw for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs 61 an acre, giving a net profit of Rs. 34. The average net profit, however, on this plot for the previous five years was only Rs. 18-12-0. The net profit this year of No. 6 was Rs. 36, and for the previous five years Rs. 29-0-0.

Area of each plot, 400 square yards.

RABI STATEMENT No. III.—This experiment is in "green manures." The series consists of 13 plots, each being 400 square yards in area. Its object is to indicate the manurial value of hemp and indigo which are applied to the plots in various forms. In the season under report all these plots were sown with Muzaffarnagar wheat on the 23rd of October and were harvested on the 10th of April. The number of ploughings, weedings, and waterings was the same as stated in the foregoing experiment. The unmanured plot in this series (as well as in several others) this year has given a fair yield. This is explained by the fact that in the present season the fields which were most advanced suffered most from wind and rain. The plots in which indigo is ploughed in green and those in which its refuse was applied have, as in previous years, given the largest yield.

RABI STATEMENT No. III.—*Green Manure Series.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre	Produce per acre.				Increase or decrease over unmanured plot per acre.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years	This year.	Average for previous five years.	This year.	Average for previous five years	This year.	Average for previous five years.	This year.
		Rs a p	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Aa1	Old indigo refuse, 120 maunds	1 3 0	1,441	1,742	2,935	3,473	+418	+580	+1,148	+1,041
Aa2	Fresh indigo refuse, 120 maunds, and lime, 6 maunds	2 6 0	1,498	1,742	2,872	4,199	+475	+580	+1,085	+1,767
Aa3	Indigo water, 3,600 cubic feet	3 0 0	933	1,016	2,018	2,045	−90	−146	+231	−387
Aa4	Hemp water, 3,600 cubic feet	3 0 0	731	1,186	1,796	2,372	−292	+21	+9	−60
Aa5	No manure	...	1,023	1,162	1,787	2,432	...	...	...	...
Aa6	Wheat sown after hemp crop had been taken ...	...	1,116	593	2,113	1,210	+80	−194	+111	−737
Aa7	Green hemp ploughed in...	3 8 0	1,183	1,125	2,355	2,335	+147	+338	+353	+388
Aa8	Green indigo ploughed in,	8 0 0	1,212	1,984	2,519	2,856	+176	+1,197	+517	+909
Aa9	Wheat sown after indigo crop	...	1,355	1,136	2,633	2,287	+319	+349	+631	+340
Aa10	Green indigo ploughed in and gypsum, 6 maunds,	18 8 0	1,228	1,452	2,405	1,597	+192	+665	+403	−350
Aa11	Green hemp ploughed in and gypsum, 6 maunds,	14 0 0	1,112	944	2,690	2,081	+76	+157	+688	+134
Aa12	No manure ...	...	1,036	787	2,002	1,947	...	...	...	...
Aa13	Alternate with lucerne ...	...	920	847	2,297	1,706	−116	+60	+295	−241

NOTE —The cost of cultivation may be taken at Rs 27 per acre, including rent, seed, labour, &c., but exclusive of manure The value of produce at a reasonable estimate may be put at Re. 1 per 32lbs of grain and Re 1 per 240lbs of straw for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs 32-4-0 an acre, giving a net profit of Rs 5-4-0. The average net profit, however, on this plot for the previous five years was only Rs. 13-8-0. The net profit this year of Nos 8 and 2 was Rs. 38-8-0 and Rs. 42-2-0 and for the previous five years was Rs. 13 and Rs. 29-2-0 respectively.

Area of each plot, 400 square yards.

RABI STATEMENT No. IV.—To confirm the results of the green manure experiment, two more series of 19 plots are kept on the list of permanent experiments.

In one of these series fresh and old indigo refuse with and without lime are applied and their result contrasted with two unmanured plots. In the other series 7 plots are manured with green hemp, results of which are compared with the 6 plots kept unmanured.

The following statement contains the results of both of these series. All the plots were sown on the 26th of October and were harvested on the 10th of April. The other treatment was the same as in other series. The plot manured with old indigo refuse and lime gave the maximum yield on the farm this year, namely 35 maunds, or 46 bushels, the acre.

RABI STATEMENT No. IV.—*Green manure experiment with wheat No. 2.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease per acre over unmanured plot.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A. 32A & L	Fresh indigo refuse, 120 maunds, and lime, 6 maunds.	2 6 0	1,085	2,613	2,334	5,324	+ 382	+ 1,226	+ 866	+ 2,760
A. 32B & K	Fresh indigo refuse, 120 maunds,	1 3 0	929	2,485	1,832	5,346	+ 226	+ 1,098	+ 364	+ 2,782
A. 32C & G	Old indigo refuse, 120 maunds, and lime, 6 maunds.	2 6 0	1,033	2,904	2,014	6,454	+ 330	+ 1,517	+ 546	+ 3,890
A. 32D & J	Old indigo refuse, 120 maunds...	1 3 0	990	2,011	1,858	6,807	+ 287	+ 624	+ 390	+ 4,243
B. 32E & A	No manure	...	703	1,387	1,468	2,564	...	...	...	...
C. 31A & D	Hemp ploughed in.. ...	3 8 0	1,076	1,113	2,153	2,348	+ 480	+ 479	+ 946	+ 1,023
D. 31F & I	No manure	...	596	634	1,207	1,325	...	...	...	...

Note.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c., but without manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 32lbs of grain and Re 1 per 246lbs. of straw for fodder. According to this estimate the outturn of the two unmanured plots (*i.e.*, 32E & A and 31F & I) this year was Rs. 53-12-0 and Rs. 25 an acre, giving a net profit of Rs. 26-12-0 and a loss of Rs. 2 repectively. The average net profit, however, on these plots for the previous 5 years was Re. 1, and a loss of Rs. 3-12-0 respectively. The net profit this year of the numbers 32 A & L and 32 C & G was Rs. 74 and Rs. 87-9 respectively.

RABI STATEMENT No. V.—This experiment shows the manurial value of certain things not commonly used as manure by the people in this country. This series consists of eight plots. All the plots were sown on the 26th of October and harvested on the 10th of April. Compost and ashes of weed which are not strong fertilizers have this year come out better than the other manures applied in this series.

RABI STATEMENT No. V.—*Miscellaneous manure series.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease over unmanured plot per acre.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
M. 1	Brick kiln refuse, 120 maunds ...	1 12 0	816	629	1,706	1,113	+255	— 73	+365	—242
M. 2	Silt, 200 maunds	0 12 0	1,028	956	1,525	2,009	+467	+ 254	+184	+654
M. 3	Compost, 200 maunds	6 0 0	896	1,476	1,750	3,125	+335	+ 774	+409	+770
M. 4	Road scraping, 200 maunds ...	4 11 0	892	799	1,798	1,888	+331	+ 97	+452	+533
M. 5	Ashes of 120 maunds of weeds ...	4 0 0	653	1,416	1,273	4,477	+ 92	+ 714	— 68	+3,122
M. 6	Ashes of 120 maunds of weed and 3 maunds saltpetre.	13 0 0	888	762	1,951	1,718	+327	+ 60	+610	+363
M. 7	Ammonic chloride, 3 maunds ...	45 0 0	701	460	1,597	1,452	+140	— 242	+256	+97
M. 8	No manure	...	561	702	1,341	1,355	...	..	...	...

Note.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c., but without manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 32 maunds of grain and Re. 1 per 216lbs. of straw for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs. 27-8-0 an acre, giving a net profit of Rs. 3-8-0 The average loss, however, on this plot for the previous five years was Rs. 4-4-0. The net profit this year of Nos. 3 and 5 was Rs. 25-12-0 and Rs. 31-4-0 and for the previous five years there was a profit of Rs. 2 and a loss of Rs. 5-8-0 respectively.
Area of each plot 400 square yards.

RABI STATEMENT No. VI.—This experiment shows the effect of deep ploughing with an improved plough against shallow ploughing with the country plough. This experiment is conducted in two series, one (A) containing four and the other (B) three plots. The plots in A series do not receive any manure, but to plots in B series farm-yard manure is applied at the rate of 200 maunds per acre. All the plots were sown on the 27th of October and harvested on the 11th of April. The manured plots suffered much from the rain of 23rd January. The deep ploughed plots, as in previous years, have given a better yield.

RABI STATEMENT No. VI.—*Ploughing experiment with wheat.*

Number of plot per farm map.	Treatment.	Cost of ploughing per acre.	Produce per acre.				Increase or decrease over the plots ploughed with country plough.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.	Average for previous five years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A. Ad. 1	Ploughed 5" deep 4 times with improved plough.	3 0 0	550	807	1,169	1,855	+58	+81	+99	+371
A. Ad. 2	Ploughed 3" deep 6 times with country plough.	4 8 0	492	726	1,070	1,484	...	...	...	...
A. Ad. 3	Ploughed 3" deep 8 times with country plough.	6 0 0	717	678	1,278	1,258	...	...	...	—
A. Ad. 4	Ploughed 9" deep 4 times with improved plough.	3 0 0	601	1,000	1,245	1,823	−116	+322	−33	+565
B. Ad./2—1	Ploughed 9" deep 4 times with improved plough.	3 0 0	716	1,332	1,552	2,586	+152	−234	+210	−322
B. Ad./2—2	Ploughed 5" deep 4 times with improved plough.	3 0 0	708	1,596	1,415	3,028	+144	+30	+73	+120
B. Ad./2—3	Ploughed 3" deep 8 times with country plough.	6 0 0	564	1,566	1,342	2,908	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c, but without manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 32lbs. of grain and Re. 1 per 240 lbs. of straw for fodder. According to this estimate the outturn of the plot ploughed with country plough 3 inches deep (*i.e.*, plot Ad./2—3) this year was worth Rs. 60-12 an acre, giving a net profit of Rs. 27-12. The average net loss, however, on this plot for the previous five years was Rs. 10. The net profit this year of the Nos. Ad./2—2 and Ad./2—1 was Rs. 32-4 and Rs. 32-8, but for the previous five years there was a loss of Rs. 2-2-0 and Re. 1-12-0 respectively.

Area of each plot of the A series is 300 square yards.

Ditto ditto B 2,420 ditto.

Temporary experiments.—Temporary experiments are those which are conducted for a limited time.

RABI STATEMENT VII.—The first of these is to ascertain the time for which the residue of a fertilizer remains available for a wheat crop. This experiment is conducted in two series of 16 plots. This experiment was for five years, which term has expired this year. All the plots were sown on the 23rd of October and were harvested on the 18th of April.

The plot which had received cowdung has this year again given the largest yield.

RABI STATEMENT No. VII.—*Experiment as to the residual value of various manures on wheat.*

	Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease over unmanured plot per acre.			
				Grain.		Straw.		In grain.		In straw.	
				Average for previous four years.	This year.	Average for previous four years.	This year.	Average for previous four years.	This year.	Average for previous four years.	This year.
				lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A	V1	Calcic superphosphate, 180 lbs., ammonic chloride, 180 lbs., potassic sulphate, 90 lbs., calcic sulphate, 96 lbs.	...	899	847	1,523	1,742	+163	...	+163	−49
A	V2	All but calcic superphosphate	...	1,022	895	1,354	1,670	+286	+48	−6	−121
A	V3	Ditto ammonic chloride	...	785	1,041	1,456	2,105	+49	+194	+96	+314
A	V4	Ditto potassic sulphate	...	873	1,016	1,548	1,912	+137	+169	+188	+121
A	V5	Ditto calcic sulphate	...	764	678	1,314	1,573	+28	−169	−46	−218
A	V6	Unmanured...	...	736	847	1,360	1,791	...	...	...	...
B	37A	Cowdung	...	1,151	1,312	2,290	2,441	+423	+376	+768	+559
B	37B	Poudrette	...	901	936	1,793	1,904	+173	...	+271	+22
B	37C	Mustard cake	...	849	860	1,716	2,054	+121	−76	+194	+172
B	37D	Woollen refuse	...	860	957	1,782	1,904	+132	+21	+260	+22
B	37E	Cowdung and bonedust	...	914	860	1,771	1,914	+186	−76	+249	+32
B	37F	Compost	...	449	946	1,680	1,764	−279	+10	+158	−118
B	37G	Indigo ploughed in	...	842	968	1,485	1,807	+114	+32	−37	−75
B	37H	Saltpetre	...	921	1,022	1,757	1,990	+193	+86	+235	+108
B	37I	Ammonic chloride	...	910	979	1,873	1,785	+182	+43	+351	−97
B	37J	No manure	...	728	936	1,522	1,832	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 27, including rent, seed, labour, &c., but without manure. The value of the produce at a reasonable estimate may be put at Re. 1 per 32 lbs of grain and Re 1 per 240 lbs. of straw for fodder. According to this estimate the outturns of the two unmanured plots, *i.e.*, V6 and 37J, this year was worth Rs. 33-12 and Rs. 36-12 an acre, giving a net profit of Re 1-14 and Rs 9-12. The average net profit, however, on these plots for the previous four years was only Re. 1-4 and Rs 4-12 respectively. The net profit this year of Nos V3, V4 and 37A and 37H was Rs. 14, Rs. 12-8, Rs. 23-12, and Rs. 13, and for the previous four years Rs. 3-8, Rs. 6-8, Rs. 18-8, and Rs. 8-12 respectively.

A.—Area of each plot of the series, 200 square yards.

B. Ditto ditto ditto 450 ditto.

RABI STATEMENT VIII.—This experiment shows the effect of kainit on wheat. This experiment was tried in two series, in one of which kainit was applied with green hemp and in the other with farmyard manure and woollen refuse. The plots in the former series (A) were sown on the 22nd of October and harvested on the 7th of April, and those of the other series (B) sown on the 25th of October and harvested on the 8th of April.

This year in the first series the unmanured plot has given the largest yield, and in the other series (B) farmyard manure and woollen refuse when applied by themselves produced more than when applied with kainit.

RABI STATEMENT No. VIII.—*Experiment with kainit on wheat.*

Number of plot per farm map.	Manure applied per acre.	Value of manure per acre.	Produce per acre.				Increase or decrease per acre over plot C.			
			Grain.		Straw.		In grain.		In straw.	
			Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years	This year.
	A.	Rs. a. p.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
A.	Green hemp ploughed in for manure and kainit, 4 maunds.	11 8 0	1,452	847	2,801	1,742	+36	−194	+176	−363
B.	Only green hemp ploughed in,	3 4 0	1,043	805	2,565	1,670	−373	−146	−60	−435
C.	No manure	...	1,416	1,041	2,625	2,105	...	...	...	...
	B.									
14*a*.	Farmyard manure, 200 maunds, and kainit, 4 maunds.	11 4 0	1,607	1,548	3,179	3,105	...	...	...	...
14*b*.	Woollen refuse, 200 maunds, and kainit, 4 maunds.	14 4 0	988	1,468	2,318	2,678	...	...	...	...
14*c*.	Farmyard manure, 200 maunds, alone.	6 0 0	1,463	1,783	2,966	3,105	...	...	...	...
14*d*.	Woollen refuse, 200 maunds;..	6 0 0	1,436	1,694	2,919	2,020	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 27 per acre, including rent, seed, labour, &c., but without manure. The value of the produce at a reasonable estimate may be put at Re 1 per 32 lbs. of grain, and Re. 1 per 246 lbs of straw for fodder. According to this estimate the outturn of the unmanured plot this year was worth Rs. 41 per acre, giving a net profit of Rs. 14. The average net profit, however, on this plot for the previous two years was Rs 28. The net profit this year of Nos. 14*c* and 14*d* was Rs. 35-4-0 and Rs. 31-12-0, and for the previous two years Rs. 25 and Rs. 23-12 respectively.

Area of first 3 plots is 400 square yards.
Ditto 4 other ditto 600 ditto.

RABI STATEMENT No. IX.—This experiment shows the effect on wheat (*a*) of grazing it by sheep, (*b*) of nibbling it with a sickle. The result is compared with a plot in which wheat was left to grow untouched, but which in other respects received a similar treatment. All plots were sown on the 25th October and harvested on the 9th April. As was expected in a year in which the rains lodged, the plants which were heavy with leaf, the plot in which the growth of leaf was not checked has yielded much less than the other two plots. Last year the result was in favour of the field left untouched.

RABI STATEMENT No. IX.—*To ascertain the produce of a field* (a) *grazed by sheep when the plants reach the height of one foot, and* (b) *of a field nibbled at the same stage with a sickle.*

Number of plot per farm map.	Treatment.	Produce per acre.				Increase or decrease per acre over plot C.			
		Grain.		Straw.		In grain.		In straw.	
		Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years.	This year.
		lbs.	lbs.	lbs.	lbs	lbs.	lbs.	lbs.	lbs.
35Aa	Grazed by sheep when one foot high,	1,059	2,148	3,369	3,999	−46	+1,197	+165	+1,859
35Ab	Nibbled with a sickle ditto ...	1,105	1,053	3,146	2,845	...	+102	−58	+705
35Ac	Left untouched	1,105	951	3,204	2,140	...	...	...	...

NOTE.—The cost of cultivation may be taken at Rs. 30 per acre, including rent, seed, labour, and manure valued at Rs. 3. The value of the produce at a reasonable estimate may be put at Re 1 per 32 lbs. of grain and Re 1 per 246 lbs. of straw for fodder. According to this estimate the outturn of the plot left untouched this year was worth Rs 38-8 per acre, giving a net profit of Rs. 8-8. The average net profit, however, on this plot for the previous two years was Rs. 17-8. The net profit this year of Nos. 35Aa and 35Ab was Rs. 50-4 and Rs. 14-10, and for the previous two years Rs. 16-12 and Rs. 17-4 respectively.

Area of each plot is 570 square yards.

RABI STATEMENT No. X.—This statement compares the produce of five varieties of wheat with the indigenous variety called "Mundia," which is commonly grown in the neighbourhood of Cawnpore. Each variety was sown in a plot measuring 700 square yards. The rains did great damage to these plots, specially to the last one (39f), in which the water lodged for a time.

In respect of yield the Panjáb red wheat has this year come out first, and Muzaffarnagar white wheat ranked next.

Last year the latter had proved the best of the lot.

RABI STATEMENT No. X.—*Yield of different varieties of wheat.*

Number of plot per farm map.	Variety of wheat.	Produce per acre.				Increase or decrease over the indigenous variety.			
		Grain.		Straw.		In grain.		In straw.	
		Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years.	This year.	Average for previous two years.	This year.
		lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
39a	Muzaffarnagar wheat	1,671	1,673	2,289	3,319	+667	+1,081	—593	+1,183
39b	Adelaide ditto	1,013	1,411	2,693	3,589	+9	+819	—189	+1,453
39c	Buxar ditto	1,083	1,604	2,308	2,503	+79	+1,012	—574	+367
39d	Sindhi ditto	927	1,106	2,990	3,402	—77	+514	+108	+1,266
39e	Mundia ditto	1,004	592	2,882	2,136	...	...	...	...
39f	Panjáb seed ditto	858	1,784	1,226	3,174	+146	+1,192	—1,656	+1,038

NOTE.—The cost of cultivation may be taken at Rs. 30 per acre, including rent, seed, labour, and manure valued at Rs. 3. The value of the produce at a reasonable estimate may be put at Re. 1 per 32 lbs. of grain and Re. 1 per 246 lbs. of straw for fodder. According to this estimate the outturn of the Mundia wheat this year was worth Rs. 27-2-0 per acre, giving a loss of Rs. 2-14. The average net profit, however, on this plot for the previous two years was Rs. 13. The net profit this year of Nos. 39f and 39a was Rs. 38-8-0 and Rs. 35-12-0, and for the previous two years Re. 1-12 and Rs. 31-8 respectively.

Area of each plot is 700 square yards.

RABI STATEMENT No. XI.—*Experiment with barley.*—This statement shows the comparative yield of certain varieties of barley. The crop on all the plots was extremely poor.

RABI STATEMENT No. XI.—*Experiment with barley.*

Number of plot per farm map.	Variety of barley.	Produce per acre.			
		Grain.		Straw.	
		Average for previous three years.	This year.	Average for previous three years.	This year.
38A	Green huskless barley	1,087	1,523	1,967	2,814
38B	Chocolate coloured barley	1,246	1,483	2,309	2,452
38C	White huskless coloured (Rasuli jau)	1,234	1,497	1,979	2,530
38D	Country ditto	1,961	1,884	2,912	2,033

NOTE.—The cost of cultivation may be taken at Rs. 23-13-0 per acre, including rent, seed, labour, &c., and manure, valued at Re. 1-8-0. The value of produce at a reasonable estimate may be put at Re. 1 per 41 lbs. of grain and Re. 1 per 246 lbs. of straw for fodder. According to this estimate the outturn of the country barley this year was worth Rs. 54-3-0 an acre, giving a net profit of Rs. 30-6-0. The average net profit, however, on this plot for the previous three years was Rs. 35-3-0. The net profit this year of Nos. 38A and 38C was Rs. 24-12-0 and Rs. 23-0-0, and the net profit for the previous three years was Rs. 10-10-0 and Rs 14-7-0 respectively.

Area of each plot is 750 square yards.

RABI STATEMENT No. XII.—This statement shows the effect of gypsum on two principal leguminous crops of the rabi, *viz.*, gram and peas. It will be seen from this statement that the effect of gypsum is very marked, especially on gram.

RABI STATEMENT No. XII.—*Experiment with gypsum applied to peas and gram.*

Number of plot per farm map.	Crop.	Manure applied per acre.	Value of manure applied per acre.	Produce per acre.		Increase or decrease due to gypsum.	
				Grain.	Straw.	In grain.	In straw.
			Rs. a. p.	lbs.	lbs.	lbs.	lbs.
27A	Gram...	Farmyard manure, 100 mds,	3 0 0	1,215	1,958	...	...
27B	Do. ...	Ditto, 50 mds., and gypsum 4 mds.	8 8 0	1,742	2,215	—527	—257
27C	Peas ...	Farmyard manure, 100 mds,	3 0 0	322	828	...	...
27D	Do. ..	Ditto, 50 mds., and gypsum 4 mds.	8 8 0	549	1,430	—127	—602

NOTE.—The cost of cultivation may be taken at Rs. 20 per acre, including rent, seed, and labour, &c., but exclusive of manure The value of produce at a reasonable estimate may be put at Re 1 per 41 lbs. of grain and Re. 1 per 328 lbs. of straw for fodder. According to this estimate the outturn of the plot manured with farmyard manure, *i.e*, No. 27A (gram) and No. 27C (peas) this year was Rs 35-9-0 and Rs. 10-6-0, giving a net profit of Rs. 12 9-0 and a loss of Rs 12-10-0 respectively. The net profit this year of Nos. 27B and 27D was Rs. 20-12-0 and a loss of Rs. 11 respectively.

Area of each plot is 450 square yards.

RABI STATEMENT No. XIII.—*Experiment with potatoes.*—This statement shows the effect of certain special manures applied to potatoes.

This experiment has been carried on for the last four years. A pretty big field was divided into five equal parts, each of which was treated with a particular manure. The crop suffered much from blight and no conclusion can be drawn from the results of this year.

RABI STATEMENT No. XIII.—*Experiment with potatoes.*

Number of plot per farm map.	Manure applied.	Value of manure per acre.	Produce per acre.		Increase or decrease per acre over the plot sown after country fashion.	
			Average for previous three years	This year.	Average for previous three years.	This year.
		Rs. a. p.	lbs.	lbs.	lbs.	lbs.
26DA	Poudrette, 200 mds., and sulphate of iron, 27 seers.	10 15 0	8,824	15,379	+2,169	+847
26DB	Woollen refuse, 200 mds., and gypsum, 4 mds.	13 0 0	8,362	13,757	+1,707	—775
26DC	Poudrette, 200 mds, and kainit, 6½ mds.,	21 7 0	6,496	14,883	—165	+351
26DD	Castor oil cake, 10 mds., and gypsum, 4 mds.	17 0 0	7,614	17,642	+959	+3,110
26DE	Sown after country fashion ...	...	6,655	14,532	...	...

NOTE.—The cost of cultivation after the country fashion may be taken at Rs. 82 per acre, including rent, seed, labour, &c, and manure valued at Rs. 18-0-0. The value of produce at a reasonable estimate may be put at Re 1 per 100 lbs. of potato. According to this estimate the outturn of the plot sown after country fashion this year was worth Rs. 140-5-0 an acre, giving a profit of Rs. 63-5-0. The average loss, however, on this plot for the previous three years was Rs. 15-7-0. The profit this year of Nos. 26DD and 26DA was Rs. 94-7-0 and Rs. 71-13-0, and loss for the previous three years was Rs. 5-14-0 and Rs. 6-4-0 respectively.

Miscellaneous experiments.—Under this head may be noticed the results of certain varieties of wheat, barley and oats received from Canada and of wheat from Messrs. Carter and Co.

The season under report was undoubtedly very unfavourable for these foreign varieties, which felt its severity even more than the indigenous varieties. They were sown in a richly manured field, and every possible care was taken in their culture, but with no effect.

The growth of all the wheats received from Canada was very slow. All of them flowered more or less. No. I proved hardiest and matured earliest of all. No. II had strong and vigorous plants, but almost all of them were killed by frost. No. III germinated well, but the plants in their growth were affected seriously by frost. No. IV suffered as badly as No. II. Nos. V and VI also suffered and came up to maturity a fortnight after No. I.

The same proved the case with the barleys. At the beginning they looked heavy crops, but all of them suffered much from frost. The grain which they yielded proved very thin, and hence the proportion of grain to straw was very low. The oats too did not fare any better than the barley and wheat. The stalk of all the varieties looked wonderfully good and stout. They will probably do better next year.

Carter's cross bred wheats.—The seed from Messrs. Carter and Co. arrived somewhat late in the season, but it was sown with every possible care on the farm and distributed to a few enterprising zamindars. The result was as indifferent as that of other English varieties of wheat hitherto experimented with on the farm. The small amount of grain which has been secured will be tried next year, but it is so very thin and light that no better results can be expected next year :—

Statement of outturn of Canadian grain.

Name of crop.	Date of sowing.	Area of each plot.	Outturn of each plot in pounds.			Outturn per acre in pounds.	
			Weight of sheaves.	Weight of grain.	Weight of straw.	Grain.	Straw.
(a) Canadian wheats—							
(1) Ladaga ,, ...	28th October 1891.	200 square yards.	82	24	58	581	1,404
(2) Red fern ,, ...			22	4	18	97	456
(3) Judket ,, ...			32	18	19	315	460
(4) White Fife ,, ...			24	8	36	194	891
(5) Red Fife ,, ...			40	5½	34½	133	935
(6) Saponka ,, ...			38	6	32	145	654
(b) Canadian barley—							
(1) Polar, six rowed ..	21st October 1891.	200 square yards.	143	26	117	629	2,831
(2) Danish Cheorbar, two rowed.		200 do. ...	58	10	48	242	1,162
(3) Beardless, two rowed ...		200 do. ...	129	26½	102	1,125	2,468
(4) Sweedish, ditto ...		400 do. ...	250	60	190	1,452	2,299
(c) Canadian oats—							
(1) Prize Chester	21st October 1891.	200 square yards.	110	21½	88½	520	2,142
(2) Canadian Triumph ...			137	32½	104½	787	2,527
(3) Rennie's Prize ...			100	18½	81½	472	1,966
(4) Welcome			129	29½	99½	708	2,367
(5) Banonza ...			138	32½	105½	787	2,553
(6) White Egyptian ...			144	35	109	847	2,638

APPENDIX A.

Note containing results of experiments tried on the Lakhanpur farm, for the year 1890-91. *This farm is conducted by and at the risk of Babu Lachman Parshad on land rented from zamindárs near the Government farm.*

Rotation Experiment.—This experiment was conducted in a field divided into 16 plots, each plot measuring $\frac{1}{10}$th of an acre. The field is rented from the zamindár at Rs. 4 an acre. Its soil consists of poor light loam. In 1885-86 it had a crop of barley, and in 1886-87 cotton; but no manure of any kind was applied to it from 1882. Thus in 1887-88, when the present experiment commenced, all the plots may be assumed to have been equal so far as their natural fertility was concerned.

The object of this experiment is to ascertain the most economical way of raising good wheat by following it with certain crops without a direct application of any manure.

For wheat all the plots were ploughed six times with the native plough, sown with Muzaffarnagar wheat seed at the rate of 1½ maunds per acre, and watered three times. None of the plots were weeded, and no manure was applied for wheat.

The following table shows the order of rotation and the net result of each plot in the past four years. The character of the season varies so greatly in different years that in an agricultural experiment like the present no safe conclusion can be drawn from figures of a single term. But it may be noticed that when indigo comes into the series the wheat outturn approaches 1 maund the plot, or ten maunds the acre, which is very good for double-cropped land of poor quality.

The experiment will be repeated after one year's rest and manuring each plot with farmyard manure at the rate of 200 maunds to the acre.

Number of plot.	Length of term of rotation.	Order of rotation of each plot and its outturn.								Total value of the outturn of each plot in four years.	Total cost of each plot in four years, including cost of cultivation and canal water rate.	Net annual profits per acre.
		First year.		Second year.		Third year.		Fourth year.				
		Crop.	Outturn.	Crop.	Outturn.	Crop.	Outturn.	Crop.	Outturn.			
1	2	3	3	5	6	7	8	9	10	11	12	13
			Mds. s		Mds. s.		Mds. s.		Mds. s.	Rs. a.	Rs. a.	Rs. a.
A.—1 ...	Annual.	Wheat'...	0 38	Wheat ...	0 35	Wheat ...	0 30	Wheat ...	0 26	11 6	10 0	3 7
A.—2 ...		Urd ...	0 20	Urd ...	0 16	Urd ...	0 15	Urd ...	0 13	14 10	13 0	4 1
		Wheat ...	0 27	Wheat ...	0 30	Wheat ...	0 26	Wheat ...	0 19			
A.—3 ...		Hemp ...	0 26	Hemp ...	0 22	Hemp ...	0 20	Hemp ...	0 17	14 8	12 12	4 6
		Wheat ...	0 25	Wheat ...	0 29	Wheat ...	0 23	Wheat ...	0 17			
A.—4 ...		Indigo ...	12 20	Indigo ...	9 35	Indigo ...	11 0	Indigo ...	10 8	18 9	13 10	12 5
		Wheat ...	0 35	Wheat ...	0 37	Wheat ...	0 28	Wheat ...	0 26			
B.—1 ...	Biennial.	Cotton ...	0 8½	Hemp ...	0 23	Cotton ...	0 10	Hemp ...	0 16	10 12	9 4	3 12
				Wheat ...	0 36	...	...	Wheat ...	0 30			
B.—2 ...		Do. ...	0 8½	Urd ...	0 18	Cotton ...	0 9½	Urd ...	0 14	9 0	9 6	0 15 (loss)
				Wheat ...	0 33	...	...	Wheat ...	0 23			
B.—3 ...		Maize†...	1 5	Indigo ...	15 0	Maize ...	1 20	Indigo ...	13 0	27 3	15 8	29 3
		Potatoes,	3 20	Wheat ...	1 2	Potatoes,	4 10	Wheat ...	1 13			
B.—4 ...		Clover ...	0 5½	Do. ...	1 0	Clover ...	0 4	Do. ...	1 2	16 0	10 0	15 0
C.—1 ...	Triennial.	Cotton ...	0 8	Hemp ...	0 27	Indigo ...	12 0	...	...	*11 4	*7 7	12 11
				Barley ...	1 5	Wheat ...	0 35	...	...			
C.—2 ...		Do. †,	0 14	Sugarcane,	Sold standing for Rs. 4.	Do. ...	1 14	...	...	*10 0	*9 3	2 11
C.—3 ...		Maize†...	1 11	Sugarcane,	Ditto.	Indigo ...	17 0	...	...	*17 0	*12 7	15 3
		Potatoes,	3 10	...	...	Wheat ...	1 3	...	...			
C.—4 ...		Turnips†,	5 20	Maize ...	1 3	Do. ...	0 38	...	...	*12 15	*7 13	17 1
				Peas ...	0 22	...	...	...	...			
D.—1 ...	Quadrennial.	Cotton ...	0 8½	Maize ...	0 24	Juar ...	0 20	Hemp ...	0 15	10 6	9 5	2 10
				Gram ...	0 26	Peas ...	0 15	Wheat ...	0 35			
D.—2 ...		Carrot†,	8 10	Hemp ...	0 25	Tilli ...	0 9	Indigo ...	12 0	15 4	9 15	13 4
				Barley ...	1 13	...	...	Wheat ...	1 5			
D.—3 ...		Maize†...	0 38	Sugarcane,	Sold standing for Rs. 4.	Bajra ...	0 24	Hemp ...	0 18	16 9	14 9	5 0
		Potatoes,	3 15	...	...	Peas ...	0 18	Wheat ...	0 38			
D.—4 ...		Turnips,	3 10	Barley ...	1 7	Clover ...	0 4½	Do. ...	1 1	14 12	8 14	14 11

* Figures for three years only. † Manured with cowdung at 200 maunds per acre.

The figures of outturn given against wheat, urd and other grain crops represent the weight of grain. The outturn of straw of each plot was not weighed separately. For column 11, which includes value of straw, its weight has been taken at the following proportion to the weight of grain:—

	Straw.	*Grain.*		*Straw.*	*Grain.*
Wheat	2	1	Urd ...	4	1
Barley	1½	1	Peas ...	3	1
			Gram ...	1½	1

The produce of cotton was not cleaned. It was sold as *kapás*, and the figures given in this table represent the weight of *kapás*.

2. *Farmyard manure* versus *ashes*.—This experiment was conducted in 12 plots, each measuring one-tenth of an acre. The soil of these plots is similar to, and their previous history up to 1886-87 the same as that of the field in which the rotation experiment was conducted. In 1887-88 they had a crop of barley, and since 1888-89 they have been under the present experiment.

The object of this experiment is (1) to ascertain the loss in manurial value of farmyard manure occasioned by burning, and the extent by which it can be made up by an addition of certain nitrogenous mineral manures, such, for instance, as saltpetre; (2) to see whether a cultivator is justified in burning his manure and using the ashes, or whether he would do better to apply it unburnt and raise *babúl* or *dhák* tree on a portion of his holding for fuel.

All the plots were ploughed six times with the native plough, sown with Muzaffarnagar wheat seed at the rate of 1½ maunds per acre, and watered three times: none of them was weeded.

The following table shows the kinds of manure that were applied and the average result of each plot. So far as produce is concerned, it is clear that, by burning, the manure loses a great deal of its value for wheat. It remains to be seen how far the financial results of the field planted with *babúl* trees in 1888-89 (when this experiment was started) affects the results of this experiment.

Number of plot.	Description and amount of manure applied per acre.	Average outturn of grain in each plot during three years, 1888-89 to 1890-91.	Loss per acre on plots 5 to 8 due to burning of the manure.		Loss per acre on plots 9 to 12, made up by addition of saltpetre.	
			In weight of grain.	In value of grain.	In weight of grain.	In value of grain after deducting cost of saltpetre.
		Mds. s.	Mds. s.	Rs. a. p.	Mds. s.	Rs. a. p.
1	Cowdung, 100 maunds... ...	1 22·5	...	...	...	...
2	Horsedung, do.	1 13 5	...	...	...	...
3	Sheepdung, do.	1 18·5	...	...	...	...
4	Pig droppings, do.	1 20 5	...	...	...	...
5	Ashes of 100 maunds cowdung ...	0 39·5	5 30	14 6 0	...	...
6	Ditto ditto horsedung ...	0 36·0	4 15	10 15 0	...	...
7	Ditto ditto sheepdung ...	0 37 5	5 10	13 2 0	...	...
8	Ditto ditto pig droppings,	1 1·5	4 30	11 14 0	...	...
9	Ashes of 100 maunds cowdung and saltpetre, 100lbs.	1 5 0	...	...	1 15	0 7 0
10	Ditto horsedung ditto ...	1 3·5	...	...	1 35	1 11 0
11	Ditto sheepdung ditto ...	1 2·5	...	...	1 10	0 2 0
12	Ditto pig droppings ditto ...	1 4·0	...	...	0 25	1 7 0

3. *Quantitative experiment with farmyard manure*.—This experiment was tried in four plots. The soil of these plots is similar to, and their previous history up to 1886-87 same as the rotation plots. In 1887-88 they had a crop of barley and 1888-89 cotton. The present experiment commenced from 1889-90. The object of this experiment is to ascertain how far the yield of wheat is increased by an increase in the quantity of farm yard manure. The following table shows the quantity of cowdung applied to each plot and its outturn in the past two years :—

Number of plot.	Weight and value of cowdung applied per acre.	Average outturn of grain in each plot in 1889-90 and 1890-91.	Increase per acre over plot No. I.	
			In weight of grain.	In value of grain after deducting extra cost of dung applied.
		Mds. s.	Mds. s.	Rs. a. p.
1	100 maunds = Rs. 3 ...	1 7·5	...	...
2	200 „ = „ 6 ...	1 15 0	1 35	1 11 0
3	300 „ = „ 9 ...	1 19 5	3 0	1 8 0
4	400 „ = „ 12 ...	1 37·0	7 15	9 7 0

4. *Value of gypsum to leguminous crops.*—This experiment was tried on indigo. To conduct this experiment on a large scale and at the same time to minimize the effect of an uneven distribution of the existing fertility in different parts of the field, a square piece of land measuring 3,600 square yards was taken, and when quite ready for sowing it was portioned out in 36 beds each measuring 100 square yards. In 18 of these beds gypsum was applied at the rate of 3, 6, and 12 maunds to the acre; the other 18 beds were kept unmanured. The beds were so arranged that for every manured bed there was an adjoining unmanured bed for comparison. Gypsum was applied at the time of sowing the seed, seed and gypsum being both mixed up with the soil by a hand hoe. The following table shows the produce of each bed :—

	Outturn of beds in which gypsum was applied at the rate of 3 maunds per acre, and the outturn of their corresponding unmanured beds.				Outturn of beds in which gypsum was applied at the rate of 6 maunds per acre, and the outturn of their corresponding unmanured beds.				Outturn of beds in which gypsum was applied at the rate of 12 maunds per acre, and the outturn of their corresponding unmanured beds.			
	Manured.		Unmanured.		Manured.		Unmanured.		Manured.		Unmanured.	
	No. of bed.	Outturn.	No. of bed.	Outturn.	No. of bed.	Outturn.	No. of bed.	Outturn.	No. of bed.	Outturn.	No. of bed.	Outturn.
		Mds. s.		Mds. s.		Mds. s.		Mds. s.		Mds. s.		Mds. s.
	1	3 20	2	3 16	13	4 27	14	4 18	25	3 12	26	2 37
	3	3 21	4	3 0	15	4 39	16	4 20	27	3 22	28	2 38
	5	3 19	6	3 18	17	4 31	18	4 19	29	3 29	30	3 14
	7	3 5	8	3 0	19	4 27	20	4 22	31	3 32	32	3 18
	9	3 10	10	3 7	21	4 33	22	4 28	33	3 38	34	3 23
	11	3 25	12	3 11	23	4 35	24	4 31	35	3 19	36	3 12
Average outturn of indigo plant per bed (100 square yards).	...	3 17	...	3 9	...	4 32	...	4 23	...	3 25	...	3 11
Increase in outturn due to gypsum, per 100 square yards.	...	0 8	...	...	...	0 9	...	...	...	0 14	...	...
		Rs. . p.				Rs. a. p.				Rs. a. p.		
Value of increased outturn per acre.	...	1 12 9	...	...	...	2 2 7	...	...	...	3 5 9	...	...
Cost of gypsum* per acre ...	...	1 1 6	...	...	...	2 3 0	...	...	...	4 6 0	...	...

* A consignment of 212 maunds of gypsum received in 1888 from Conservator of Forests, Central Circle, cost Rs. 64-6-0 (exclusive of forest dues, which were not charged in the present case) or about 4 annas 10 pie per maund. Adding to this one anna for cost of pounding, the total cost per maund of gypsum when it is in a state for applying to the field amounts to 5 annas 10 pie.

It will thus be seen that although gypsum has a beneficial effect on indigo and more or less increased its produce in every bed, yet the value of increased outturn does not cover the cost of gypsum unless it could be had in the plains at a cost not more than 8 annas a maund and be applied sparingly at the rate of not more than three maunds an acre.

5. *Mixed crops.*—The following mixtures of cotton and juár were tried during the past year :—

I.—1. Cotton and arhar.
2. Do. castor.
3. Do. tilli.
4. Do. urd.
5. Cotton, arhar and tilli.
6. Do. do. do. urd.
7. Do. do. urd, tilli, castor, juár and arhar.

II.—1. Juár and arhar.
2. Do. arhar and til.
3. Do. do. do. lobia.

Each of these was sown in a plot measuring one-fourth of an acre, and there was one plot for pure cotton and another for pure juár in each series. Each plot in its respective series received the same treatment. The land in which these plots are made is poor outlying land, rented at Rs. 3 an acre. I am not aware of any manure being applied to this land for many years past, and it grows only rain crops. The object of this experiment was to determine the utility of sowing mixed crops, and to ascertain the quantity by which the outturn of the principal crop is diminished. The following table shows the outturn and the financial result of each plot :—

Number of plot.	Crop.	Outturn per acre. Grain.	Outturn per acre. Stalk.	Value of outturn per acre.	Cost (including rent) per acre.	Net profit per acre.
	Cotton Series.	Mds. s.	Mds. s.	Rs. a. p.	Rs. a. p.	Rs. a. p.
1	Cotton	4 5	...	20 10 0	13 6 0	7 4 0
2	Cotton	3 16	...	21 2 9	13 7 6	7 11 3
	and					
	Arhar	1 18	4 24			
3	Cotton	2 34	...	17 10 6	13 7 0	4 3 6
	and					
	Castor seed	0 34	...			
4	Cotton	3 35	...	21 10 0	13 6 6	8 3 6
	and					
	Tilli	0 18	...			
5	Cotton	3 34	...	23 14 6	13 7 0	10 7 6
	and					
	Urd	1 3	4 80			
6	Cotton	3 4	...	18 13 0	13 8 0	5 5 0
	Arhar	1 0	3 15			
	and					
	Tilli	0 3	...			
7	Cotton	3 12	...	21 4 0	13 8 6	7 11 6
	Arhar	1 4	4 3			
	and					
	Urd	0 24	2 1			
8	Cotton	3 4	...	25 3 0	13 10 6	11 8 6
	Arhar	1 12	3 27			
	Urd	0 22	1 33			
	Castor	0 16	...			
	Juár	0 20	4 5			
	and					
	San	0 16	...			
	Juár Series.					
1	Juár	7 6	46 0	24 8 0	12 7 3	12 0 9
2	Juár	5 20	34 0	24 0 6	12 10 0	11 6 6
	and					
	Arhar	2 0	5 28			
3	Juár	6 12	36 0	27 6 0	12 11 0	14 11 0
	Tilli	0 16	...			
	and					
	Arhar	1 30	5 8			
4	Juár	5 2	30 0	26 1 9	12 11 0	13 6 9
	Arhar	1 32	6 0			
	and					
	Lobia	0 30	3 20			

Imported seed.—The following varieties of Canadian wheat were tried last year: —

1. Red Fife.
2. Red Fern.
3. White Fife.
4. Saponka.
5. Judket.
6. Ladoga.

Only a few ounces of the seed of each variety were received. All the varieties were sown in a richly manured field in beds measuring one-ninetieth of an acre. Close to them on beds of an equal size were sown three Indian varieties for comparison. In each bed seed was dibbled by hand. The Canadian varieties matured a long time after the Indian varieties, and had to be watered from five to eight times, according to the time they took in maturing: the Indian varieties were watered only three times. All of them suffered much from the hot winds, which shrivelled up the grain when it was

forming. The following table shows the outturn of each variety. The produce has been carefully kept imbedded in a bed of *bhusa* for trial in the next year.

Variety of wheat.	Outturn per acre.		Remarks.
	Grain.	Straw.	
	Mds. s.	Mds. s.	
Imported.			
Red Fife	5 36	24 0	
Red Fern	3 4	20 0	
White Fife	2 10	17 0	
Saponka	8 28	26 20	
Judket	7 29	47 20	
Ladoga	7 12	46 20	
Indigenous.			
Muzaffarnagar	18 11	28 0	
Mundia	18 0	25 0	
Buxar	18 0	29 0	

L. P. BARMAH,

Persl. Asst. to Director, Land Records and Agriculture.

APPENDIX B.

Result of experiments to ascertain the yield of crops in the neighbourhood of the farm.

These experiments have this year been started to ascertain the yield of crops grown in the neighbourhood of the Government farm by ordinary cultivators following the ordinary methods of native husbandry. They were carried out by the farm overseer, Syed Ali Hossain.

1. *Sugarcane.*—In the village of Kakadeo two fields were selected for the experiment. Plot No. 1 was on *gauháni* land belonging to Thakur Uggar Singh, a cultivator, and situated about half a furlong from his house and paying a rent of Rs. 9 the bígha: the other was in *manjha* land belonging to Lachhu, caste Lodh, some two furlongs from his house and rented at Rs. 5-9-0 the bígha.

The owners agreed to the experiments on the conditions that the whole experiment was done on the spot and at the farm's expense, and that the outturn of *gúr* should be made over to them.

Two Nahan sugar mills of two rollers and one Behea evaporating shallow pan were sent to the village by the farm, and five biswas of cane in each field was carefully measured off and cut daily as required for the two mills. The cane in both fields was of the "matna" variety and was sown in the same month. The previous history of each field, as gathered from the cultivators, is given below. The Cawnpore bígha measures 2,450 square yards. The *maund* is the railway maund of 82 28lbs.

The outturn of each plot was as follows :—

Field.	Total weight of 5 biswas cane.		Total weight of juice extracted.		Total weight of *gúr* made.		Produce per acre in pounds.		
	Mds.	Seers.	Mds.	Seers	Mds.	Seers.	Cane.	Juice.	Gúr.
						Srs. ch.			
Plot No. 1 (gauháni) ...	39	12½	19	21½	3	9 7	25,465·6	12,657 7	2,093·8
Ditto 2 (manjha) ..	37	30	25	...	4	13 11½	24,454 3	16,197 5	2,810·8

Thus the less highly manured and lower rented field produced more juice and *gur*. The explanation given was that plot No. 1 had been over-irrigated. The selling price of *gúr* averages about 20lbs. a rupee. On the Cawnpore farm a field of *peri* (*i.e.*, cane grown from the stocks of the previous year) gave a better outturn than this. The outturn of this field was as follows :—

Cane.	Juice.	Gúr.
lbs.	lbs.	lbs.
27,207 7	12,869 4	2,243·4

The cultivator of plot No. 2 had in previous years sold his cane standing, but was so pleased with the outturn of *gúr* that he hired a mill and an evaporator from the farm to work off the rest of his field.

2. *Rabi experiment.*—Some fields of cultivators close to the farm were selected. Five biswa of each field was measured and marked out, and the crops cut under supervision. The sheaves were removed to the farm premises where they were weighed and thrashed.

Field.	Crop.	Weight of unthrashed sheaves.	Outturn of each plot in pounds.		Outturn per acre in pounds	
			Grain	Straw.	Grain.	Straw.
		lbs.	lbs.	lbs.	lbs.	lbs.
Plot 1 ...	Wheat bearded	728	276¾	451¼	2,189	3,562
Do. 2 ..	Ditto	280	93¼	184¾	739	1,458
Do. 3 ...	Bijhra (barley and gram mixed) ...	479	172⅛	266⅛	1,060	2,150
Do. 4 ...	Barley (country)	369	131¼	205⅛	1,035	1,624
Do. 5 ...	Ditto	384	186	188½	1,470	1,490

The produce of plot No. I was thrashed by bullocks after country fashion, while that of No. II with Mayfurths' Hand Thrasher. It is noticeable that in the former case the weight of grain and straw together was equal to that of sheaves thrashed, while in the latter case it was proved to be somewhat less. This is probably owing to the fact that in thrashing by bullocks some dust from the ground is mixed with the *bhúsa*, while in that thrashed with machine minute particles of straw as well as dust are blown out.

In selecting fields for this experiment endeavour was made to illustrate the following cases :—

(1) Good soil with a good cultivator of fair means and circumstances.

(2) Good soil with an indifferent cultivator of poor means and circumstances.

(3) Common soil with a good cultivator of poor means and circumstances.

(4) Common soil with ordinary cultivators.

Plot No. I is held by a man of fair means. He has seven relatives, who all assist him in the work. His field was injured to some extent by high winds and frost, but the best portion of it was selected in order to get an idea of high farming in this locality. The selected portion gave the high yield of 26 maunds or 33 bushels the acre : but the average for the whole field would not exceed 18 or 20 maunds. This was as good a field as could be found near the farm. The highest yield on the farm was 45 bushels the acre this year.

Plot No. II is of good soil, but the cultivator is indifferent, nor has he sufficient means. The outturn was only 9 maunds to the acre.

Plot No. III is held by a very hardworking woman, but she is altogether at the mercy of her mahájan and cannot get advances when she needs them. The outturn was 13 maunds the acre.

Plots No. IV and No. V are held by average cultivators in poor circumstances. The former gave 13 maunds and the latter 15½ maunds the acre.

It is a fact worth noticing that, owing to the scarcity of fodder even the well-to-do cultivators cannot keep a sufficient number of cattle for their farms. Though the cultivators of fair means can afford money for the purchase of manure, yet want of carts and of farm roads stand in their way. Their crops also suffer very much from insufficient irrigation. If the season is favourable, they make a small profit ; otherwise they are extremely badly off.

Regarding the disposal of the crop by these cultivators the following information was collected :—

The holder of plot No. I, who is not in his mahájan's power, has this year sold his wheat (being of better quality) to his mahájan at 15¼ seers per rupee and has kept *bijhra* and *birra* for his own use.

The holders of plots No. II and III. being in debt to their mahájan, have made over most of the produce to him, keeping a very small quantity for their own use. The mahajún gave them credit for their wheat at the rate of 17 seers the rupee, the market rate being 15½ seers.

The petty cultivators, who are either professional men or labourers, usually cultivate at an average a bígha of land for their own use and seldom sell their produce. The holders of plots IV and V are cultivators of this kind. They have kept their produce.